

ATTACHMENT 1- APPENDIX B ENVIRONMENTAL PERFORMANCE STANDARDS

The Munitions Management Device, Version 1 (MMD-1) system is categorized as a miscellaneous treatment unit under the Resource Conservation and Recovery Act and the State of Utah Hazardous Waste Management Rules. The environmental performance standards required by 40 CFR 264.601 and Utah Administrative Code R315-8-16 for miscellaneous units are therefore applicable and are presented in this section. The MMD-1 system will be designed, located, and operated in a manner to preclude the release of hazardous constituents that may have adverse effects on human health or the environment. This section describes the potential pathways of waste constituent release, the potential impact of such releases, and the location features that will minimize potential risks. Also included are MMD-1 design and operating procedures that will help minimize the potential for release of wastes during operations.

B1.1 MISCELLANEOUS UNIT WASTES [40 CFR 264.601(a)(1), 264.601(b)(1), 264.601(c)(1); R315-8-16]

The chemical agents, industrial chemicals, and associated munitions and Department of Transportation (DOT) cylinders that will be processed during testing of the MMD-1 system are described in Section 4 of this permit application.

B1.2 CONTAINMENT SYSTEM [40 CFR 264.601(b)(2); R315-8-16]

A description of the MMD-1 containment system is provided in Section 5.

B1.3 SITE AIR CONDITIONS [40 CFR 264.601(c)(4); R315-8-16]

The following paragraphs describe the atmospheric, meteorologic, and topographic features that affect air quality conditions in the area of Dugway Proving Ground (DPG) Building 3445, the MMD-1 system test location.

B1.3.1 Topography

DPG is located in a remote area of central Utah, within Tooele County, in the southwest corner of the Great Salt Lake Desert, and extends into parts of Dugway and Skull Valleys, approximately 55 miles by air west-southwest of Salt Lake City.

DPG covers approximately 1,255 square miles and includes mountains, valleys, and a large, flat, sparsely vegetated area that extends westward into the southern reaches of the barren salt flats of the Great Salt Lake Desert. Most of this land is unimproved, with 300 acres of improved land and 536 acres of semi-improved land, mostly in English Village.

The terrain is mainly flat or gently sloping, with intermittent sand dunes and small hills. The Cedar Mountain Range extends from English Village to the northwest, forming the northeast boundary of the reservation. Little Granite Mountain, Camel Back Ridge, Wig Mountain, and Granite Mountain divide the DPG installation into several minor areas.

DPG is in a middle-latitude, dry climate, or steppe region. It is characterized by a hot and dry summer, a cool spring and fall, a moderately cold winter, and a general lack of precipitation.

The Continental Divide, to the east of the Great Salt Lake Basin, generally provides a barrier to the advection of extremely cold, continental arctic air that is common over the central part of the United States during winter.

The MMD-1 system will be situated inside Building 3445, which is located at the DPG Carr Facility, approximately 2.5 miles southeast of the Ditto Area. The Carr Facility is on the lower elevations of the desert valley west of Little Granite Mountain, at an elevation of approximately 4,360 feet above mean sea level.

B1.3.2 Atmospheric and Meteorological Conditions

DPG is located in the Great Salt Lake Basin, where there is a great variability in precipitation patterns. Topography influences precipitation patterns, causing precipitation in some areas to be greater than the regional average.

The vicinity is influenced by the continental winter storm track. These storm systems start affecting the area in early fall and last until late spring. The storm track in the summer is well to the north and seldom affects the vicinity. The mountain barriers west of the basin tend to deplete the moisture from the storm systems, contributing to the general aridity of the area. In the winter, the storm systems are separated by occasional 2- to 3-week periods of stagnant high pressure. These high-pressure situations are characterized by trapped cold air in the valleys. The air-stagnation conditions can create air pollution episodes. Fog is a frequent occurrence during winter high-pressure conditions.

The summer is generally hot and dry. Rainfall during this period is basically a shower or thundershower. The shower cells, generally widely separated, exhibit no particular pattern over the valley floors. Greater precipitation occurs in mountainous areas because of the effect of mountains on lifting air. **Figure B1-1** shows the mountainous topographic features in the vicinity of DPG.

The area experiences extreme daily and seasonal temperature ranges. Extreme and mean monthly temperatures are summarized in **Table B1-1**. The winds over the vicinity are affected extensively by local conditions. These local influences are not noticeable when strong winds are prevalent. Strong winds result from large-scale weather storm patterns and are generally unaffected by local conditions. There is some reorientation of these large-scale wind fields with terrain. Light winds, primarily of local origin, are generally southeasterly at night and northwesterly in the day over the valley floors. The winds near the mountains usually have very different local effects and do not necessarily reflect the general nighttime-southeast and daytime-northwest patterns. Monthly prevailing wind direction and mean wind speeds are summarized in **Table B1-1**; **Figure B1-2** presents the wind rose for DPG.

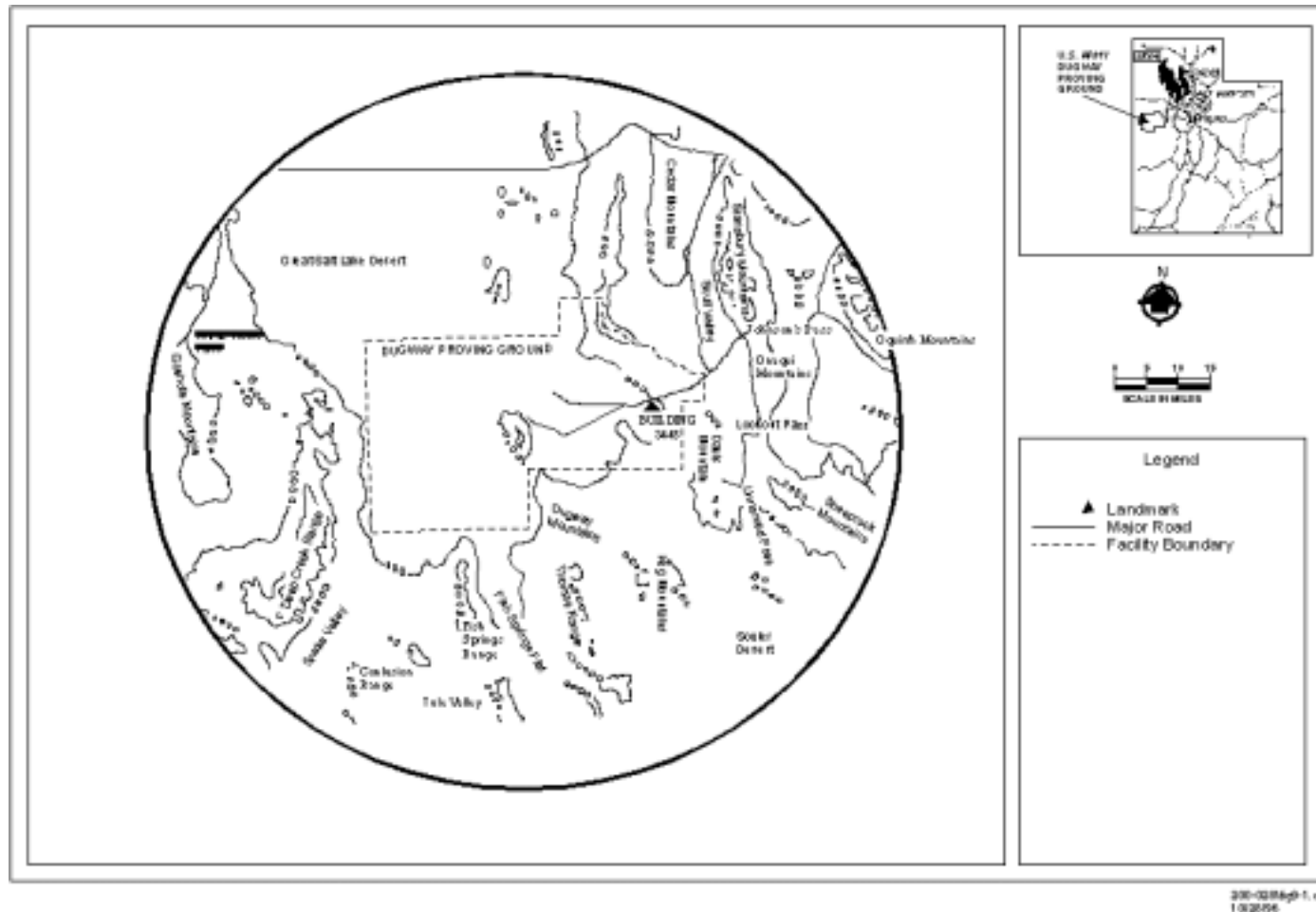


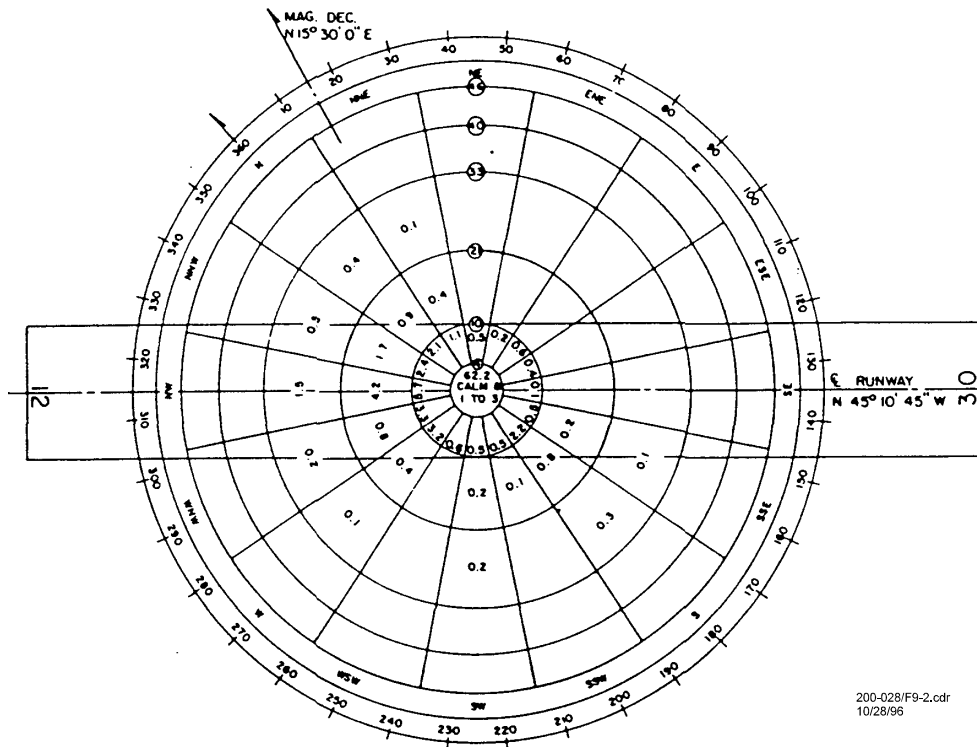
Figure B-1. Topographic Features in the Vicinity of Dugway Proving Ground, Utah

Table B1-1. The Monthly and Annual Climatic Averages or Extremes for Dugway Proving Ground^a

	Average Relative Humidity ^b (%)	Minimum Relative Humidity ^b (%)	Maximum Relative Humidity ^b (%)	Ditto Technical Center ^b		Mean Monthly Precipitation (in.)	Mean Monthly Snowfall (in.)	Temperature		
				Prevailing Wind Direction (10 Degree Sectors)	Mean Wind Speeds (Knots)			Extreme ^c (°F)		Average ^c (°F) Mean
				Max.	Min.					
January	75	18	100	14-16	4	.48	3.9	66	-25	27
February	70	15	100	14-16	4	.55	3.3	70	-27	34
March	57	7	100	17-19	6	.73	3.5	80	-6	40
April	44	3	100	17-19	6	.80	1.3	88	13	50
May	41	3	100	17-19	6	.70	.5	97	21	60
June	31	3	98	17-19	5	.76	0	107	31	69
July	26	3	98	17-19	5	.35	0	109	27	78
August	33	6	96	17-19	5	.51	0	105	39	76
September	35	6	99	14-16	5	.44	0	101	27	65
October	46	7	99	14-16	4	.50	.1	89	17	53
November	62	14	100	14-16	4	.51	2.0	78	-8	39
December	74	20	100	14-16	3	.60	3.7	64	-17	29
Annual	50	9	99.17	17-19	5	6.86	18.9			52

NOTES:

- a *Dugway Proving Ground Resource Conservation and Recovery Act (RCRA) Part B Permit Application for Open Burning/Open Detonation*
b US Army Dugway Proving Ground, *Climatological Report No. 3, Dugway Vicinity*, by N.A., Opstad, Meteorological Division, December 1966
c Obtained from Ditto Weather Station Records



Source: Dugway Proving Ground Resource Conservation and Recovery Act (RCRA)
Part B Permit Application for the Central Hazardous Waste Storage Facility

SURFACE WIND ROSE

Maximum Percentage of Wind Coverage, Based on a 13 M.P.H.
Crosswind Component: 96.6%

Velocity Groups

0-3 MPH 62.2%
4-10 MPH 24.7%
11-21 MPH 9.8%
22-33 MPH 3.3%
34-40 MPH 0.0%

Total Observations:

Period of Record: 1943-1945 and 1949-1967
Where Observed: Ditto Weather Station
Scale: 0.1 = 2 M.P.H.

Note:

Wind percentages do not total 100% due to machine run data
in which all figures are rounded to nearest 0.1% causing
some fractional parts to be dropped.

Average Daily Temperature During Hottest Month: 94 F or 34.3 C.

Figure B1-2. Annual Wind Rose

DPG air stability has been characterized with the Pasquill Stability Classification. This classification system describes dispersion capability. Stability Category A is very unstable, C and D are neutral, and F is very stable (affording the least dilution). The frequency of distribution is summarized in **Table B1-2**.

Nighttime and daytime mixing heights have been characterized for DPG. Mixing heights describe the upper boundary of vertical dilution from ground-level sources, an important factor in evaluating dilution potential.

Under strong nocturnal inversion conditions and light winds (approximately 1 m/sec), the mixing height over the DPG test range is approximately 20 meters. At wind speeds of 4 m/sec, the nighttime mixing height increases to approximately 100 meters. The daytime mixing height (primarily thermal) increases during the prime heating period of the day. **Figures B1-3 through B1-6** indicate the seasonal mixing heights by time of day and wind speed for the vicinity.

The area is generally characterized by sparse precipitation over the valley floors. Precipitation varies widely from year to year and month to month. The average precipitation for the year is 17.4 centimeters. The heaviest precipitation normally occurs in December, April, and May. Large amounts of precipitation can occur around the mountains. Heavy snowfalls occur in some areas of the mountains. Thunderstorms in the summer are more frequent over the mountains and can cause extensive soil erosion and flash floods. Monthly and annual precipitation and snowfall are summarized in **Table B1-1**.

B1.3.3 Air Quality

DPG is in an area remote from major air pollution sources. Local sources are scattered and are of insufficient strength to result in significant air pollution in the DPG area. The air pollution sources in Tooele County are listed in **Table B1-3**. The DPG installation is more than 250 miles west of any major pollution source. Atmospheric mixing over such long distances disperses any pollutants before they reach DPG. Closer source areas to the west, such as Ely and Elko, Nevada, are separated from DPG by mountain ranges. These mountains block the free eastward movement of pollutants and induce atmospheric turbulence, which disperses the pollutants. Major sources to the east of DPG along the Wasatch Front are downwind in terms of major air circulation patterns and are separated from DPG by three mountain ranges. These atmospheric and topographic conditions substantially limit the movement of atmospheric pollutants from the Wasatch Front to the DPG area.

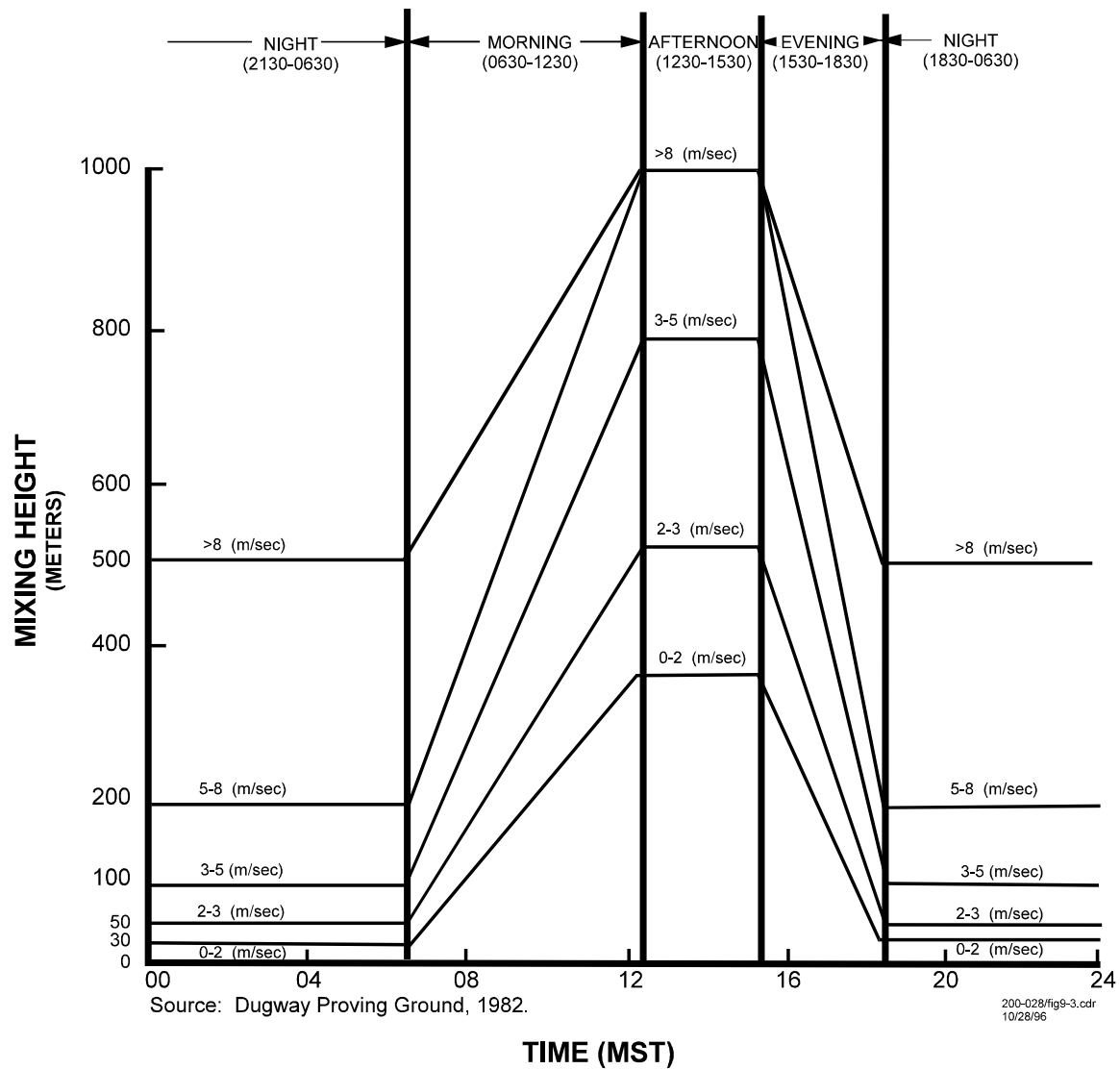
Atmospheric temperature inversions occur in the DPG area during the winter months and sometimes result in pollutants accumulating for periods in excess of 2 weeks. However, point and area sources in the vicinity are not sufficiently strong to result in a serious pollution problem. Magcorp Magnesium is Tooele County's most significant point source of air pollution (**Table B1-3**).

Air quality at DPG during the summer months can be affected by range or forest fires in the vicinity or the surrounding region. Particulate matter and gaseous pollutant concentrations from the fires can be pronounced, depending on the location of the fire and prevailing winds at the time. Such conditions generally are of short duration and do not represent a threat to either human health and safety or the environment.

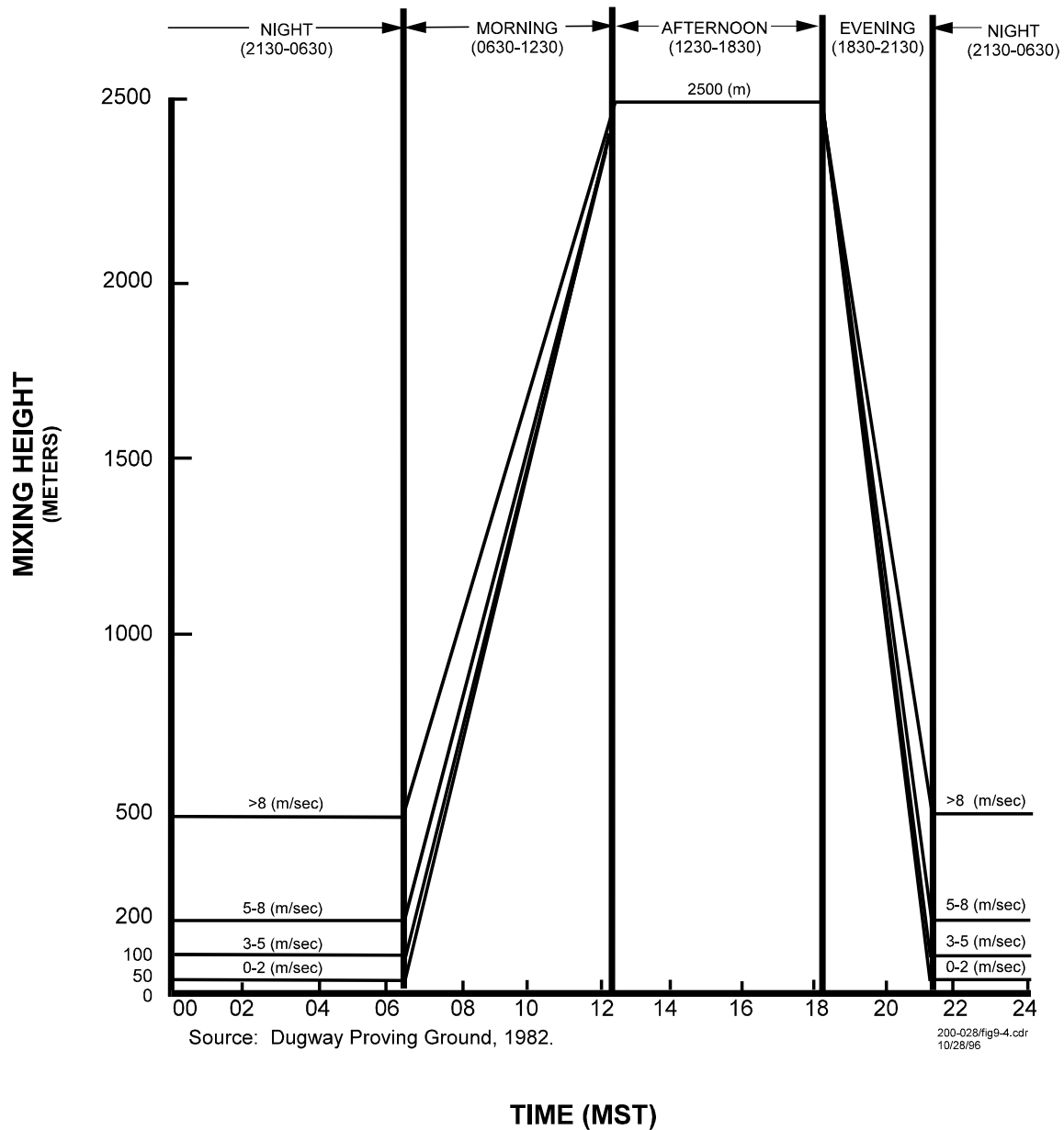
**Table B1-2. Frequency Distribution of Pasquill Stability Categories
with Associated Wind Speeds and Mixing Depth¹**

Pasquill Stability Depth Category	Percent Frequency of Occurrence	Median Wind Speed (m/sec)	Median Mixing (m)
Winter			
A	0.1	0.9	540
B	2.3	1.1	540
C	6.7	2.6	377
D	55.4	4.1	215
E	16.2	2.9	100
F	19.4	1.4	50
Spring			
A	1.3	1.6	2310
B	9.3	2.3	2310
C	14.9	3.7	1277
D	42.4	5.1	245
E	14.3	3.1	150
F	17.8	1.8	100
Summer			
A	4.2	2.1	3625
B	11.4	2.8	3625
C	19.5	4.0	1892
D	30.5	5.0	200
E	16.3	3.4	100
F	18.0	2.1	80
Fall			
A	0.2	0.9	1470
B	7.7	1.8	1470
C	12.4	3.4	845
D	37.7	4.9	220
E	18.4	3.4	100
F	23.6	1.9	80

¹ Source: *Dugway Proving Ground Resource Conservation and Recovery Act (RCRA) Part B Permit Application for Open Burning/Open Detonation Areas.*



**Figure B1-3. Diurnal Variation in the Surface Mixing Height at
 Dugway Proving Ground During the Winter**



**Figure B1-4. Diurnal Variation in the Surface Mixing Height at
Dugway Proving Ground During the Spring**

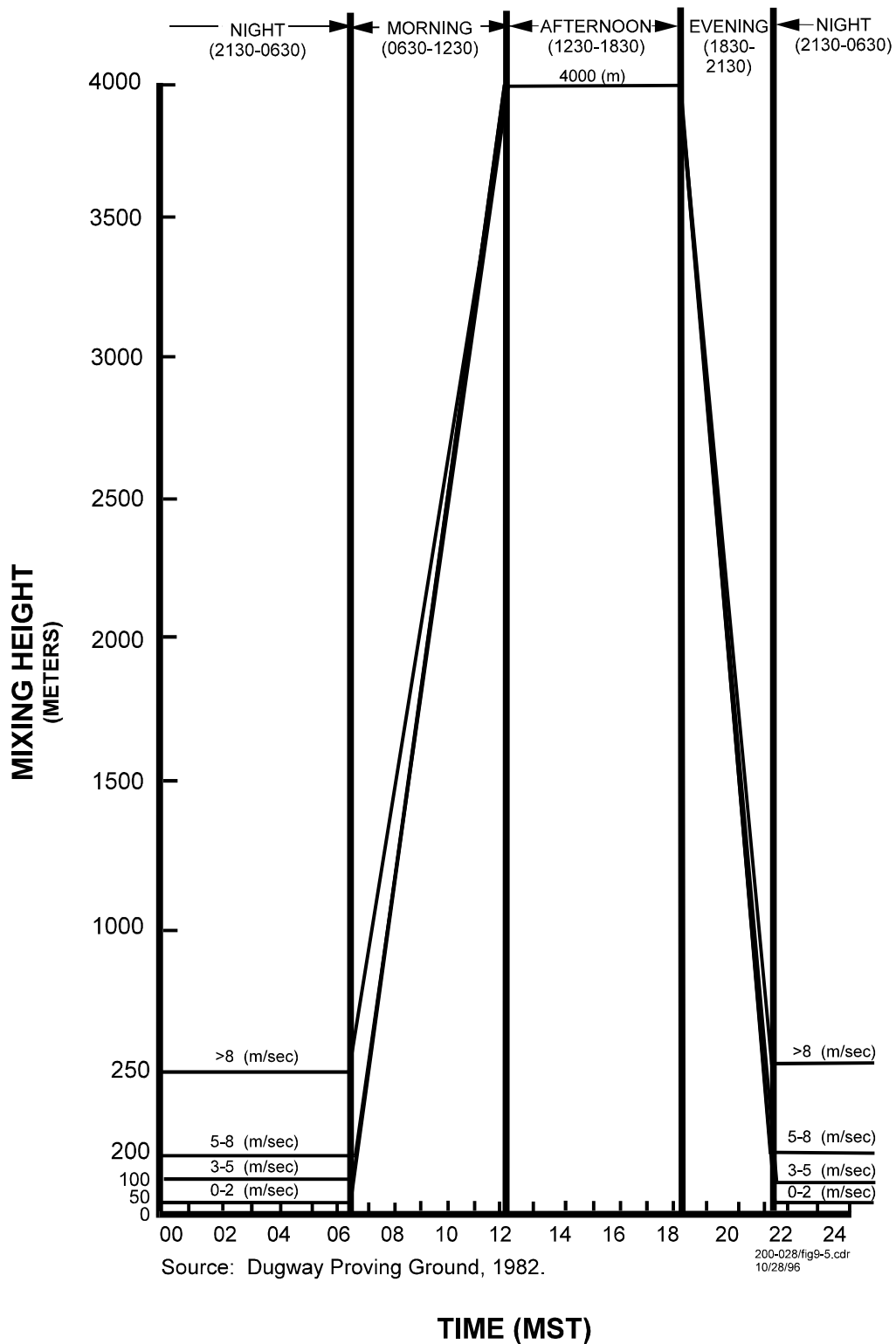


Figure B1-5. Diurnal Variation in the Surface Mixing Height at Dugway Proving Ground During the Summer

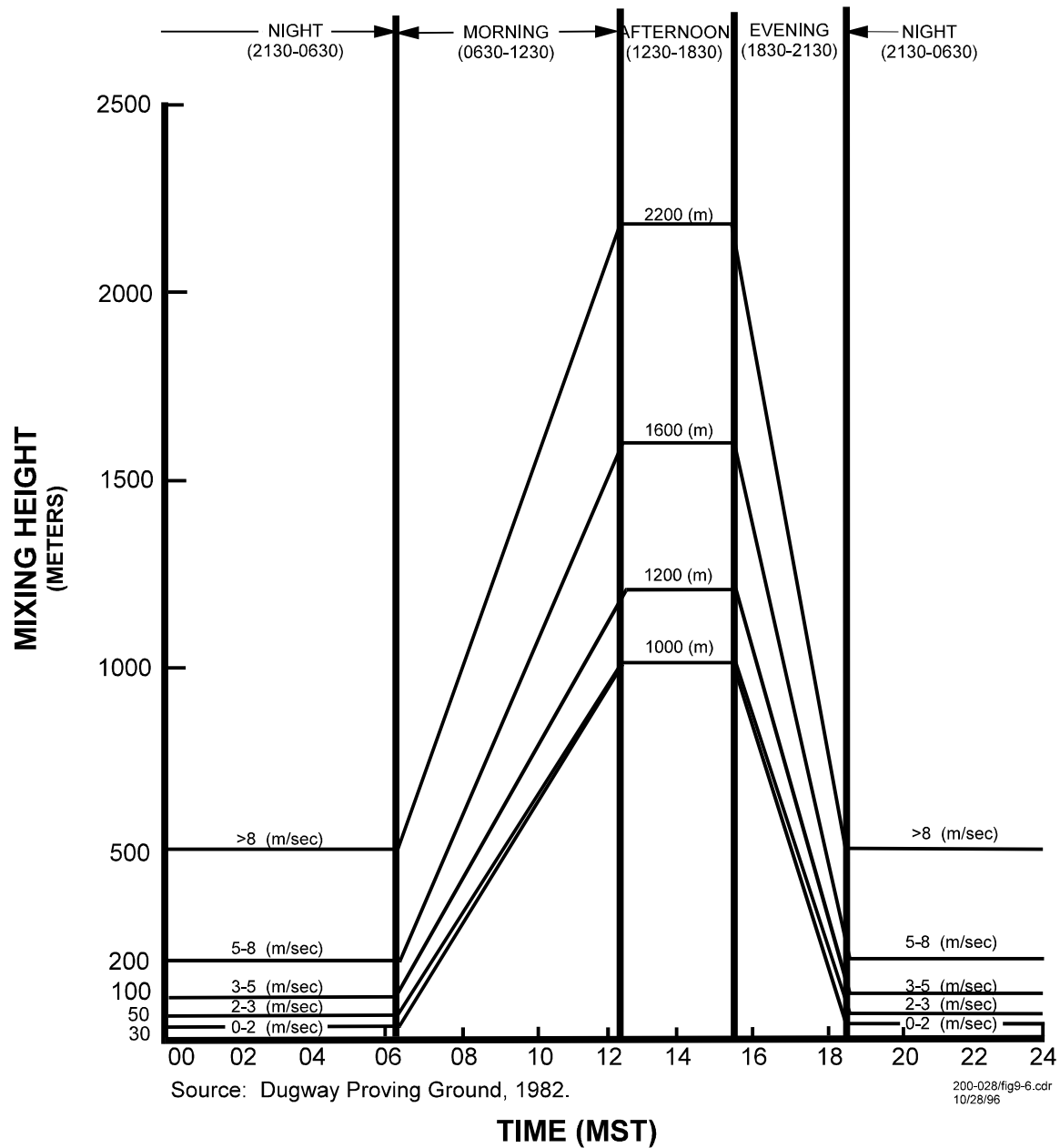


Figure B1-6. Diurnal Variation in the Surface Mixing Height at Dugway Proving Ground During the Fall

Table B1-3. Division of Environmental Health, Bureau of Air Quality, 1987 Emission Inventory for Process Industries and Power Generation Sources, County Summary, Tooele County

Point Source	Tons per year						
	FD	TSP	SO _x	NO _x	HC	CO	Misc.
Magcorp Magnesium	0.0	1,097.0	69.0	420.0	9.0	84.0	38,261.0
American Salt	27.5	53.1	0.4	11.2	0.5	2.7	0.0
Barric (formerly Getty Mining) Mercur	293.3	9.3	7.5	80.8	5.1	25.6	0.0
Del Solglio (formerly Chevron U.S.A.)					Site closed		
Chemstar (formerly Genstar Lime)	38.3	43.9	3.9	78.6	0.7	55.1	0.0
Climax Chemical	0.0	4.2	0.0	4.6	0.2	1.0	20.0
Concrete Products (Lakeside)	3.4	0.0	0.0	0.0	0.0	0.0	0.0
Dugway Proving Ground	3,177.0	8.0	75.4	37.8	37.5	226.9	1.2
Glen's Excavating	56.5	10.4	7.7	18.8	2.5	9.1	0.6
Interstate Brick	4.8	0.0	0.0	0.0	0.0	0.0	0.0
Ireco Chemicals (burning grounds)	0.0	16.6	0.0	0.0	0.0	0.0	0.0
Kaiser Chemical	6.7	38.8	13.4	59.7	4.3	15.4	0.0
La Grand Johnson (Grantsville)	15.6	0.0	0.0	0.0	0.0	0.0	0.0
Lake Point Salt	17.2	12.8	0.5	8.1	0.6	1.9	0.0
Lost Dutchman	40.7	1.9	2.9	27.6	1.7	11.4	0.0
Tooele Army Depot	506.2	415.7	154.6	266.3	514.3	950.6	2.2

MMD-1, RD&D, RCRA Permit
Issued May 14, 1999

	Tons per year						
Point Source	FD	TSP	SO _x	NO _x	HC	CO	Misc.
U.S. Pollution Control (formerly Marblehead Lime)	26.7	38.7	71.4	84.7	8.4	57.1	0.2
W.W. Gardner	15.5	0.3	1.1	0.2	0.1	0.2	0.5
Total	4,229.5	1,750.7	407.8	1,098.7	584.9	1,441.1	38,314.3

NOTES:

CO = carbon monoxide
 FD = fugitive dust
 HC = hydrocarbons
 Misc. = miscellaneous
 NO_x = nitrogen oxides
 SO_x = sulfur oxides
 TSP = total suspended particulates

Source: Utah Bureau of Air Quality, 1987. 1987 Utah Air Emission Inventory - Appendix A. Department of Health, Division of Environmental Health.

The DPG area is within the attainment category for all of the National Ambient Air Quality Standards and is classified as class II under the "prevention of significant deterioration" regulations (UDOH, 1990). A small area in the Oquirrh Mountains east of DPG and above 5,600 feet is a nonattainment area for sulfur dioxide (USDI, 1988). The closest class I areas are in southeastern Utah (USDI, 1985), sufficiently distant that visibility regulations protecting integral vistas associated with these class I areas do not affect the DPG area. The Environmental Protection Agency (EPA) currently has no plans to reclassify wilderness areas in the vicinity of DPG as class I prevention of significant deterioration areas.

Clean Air Act permitting requirements were evaluated for the MMD-1 test activities. Routine or accidental air releases are not expected to occur. All detoxification operations will take place in an enclosed, vapor-contained structure. Vapors and gases formed during the treatment process will be passed through the gas processing and waste gas processing systems for scrubbing prior to being vented to the MMD-1 process trailer carbon filtration unit. The exhaust from the process trailer carbon filter system will then be released to the Building 3445 East Chamber and exhausted to the Building 3445 activated carbon filter system. This information was provided to the State of Utah, Division of Air Quality for a determination, and it was concluded that the MMD-1 test activity does not require an Air Quality Approval Order (letter to Ed Duplack, Chief Environmental Program Office, DPG, from Russel A. Roberts, Executive Secretary, Utah Air Quality Board, June 13, 1994). Additional information relating to the mobile laboratory carbon filtration system and the possible use of two standby diesel generators was recently submitted to the Utah Division of Air Quality resulting in the same decision.

B1.4 PREVENTION OF AIR EMISSIONS [40 CFR 264.601(c)(2); R315-8-16]

All detoxification operations will take place within the MMD-1 process trailer, located within Building 3445, East Chamber. During MMD-1 operations, the possibility exists for the release of hazardous constituents to the atmosphere. To ensure that toxic material is not released, emissions from the MMD-1 will be mitigated by several means. Vapors and gases formed during the detoxification process will be passed through the gas processing and waste gas processing systems (including a gas reactor and carbon adsorption unit) for scrubbing prior to being vented to the MMD-1 process trailer carbon filtration unit. The treated exhaust from the process trailer will then be released to Building 3445, East Chamber and exhausted to the Building 3445 activated carbon filter system.

Also, to ensure that toxic material is not released to the atmosphere, Building 3445, East Chamber is fundamentally airtight and operates at a slight negative pressure relative to surrounding rooms and the atmosphere. This will ensure that any leakage from the MMD-1 system will remain in the test chamber. Negative pressure is maintained and measured by a mechanical gauge sensor device in the Building 3445, East Chamber. The negative pressure results from operating the building ventilation and filtration system at a 13,000 cfm flow rate in the East Chamber.

No untreated air resulting from MMD-1 test operations will be released to the environment. If the MMD-1 gas scrubber system were to fail, the air would be exhausted to the process trailer carbon filtration unit and then vented to the Building 3445 carbon filter system. If the Building 3445 ventilation system were to fail, a second backup fan would activate. The Building 3445 carbon filter system is monitored to alarm if agent is detected between carbon filters. If the alarm were to sound, MMD-1 operations would be halted, and any contaminated air in the test chamber would be treated by the remaining Building 3445 carbon filters. Carbon filters would then be replaced before continuing new operations. Engineering details of the MMD-1 gas processing, waste gas processing, process trailer carbon filter systems, and the Building 3445 activated carbon filter system are described in Section 5 of this permit application.

B1.5 OPERATING STANDARDS [40 CFR 264.601(c)(3); R315-8-16]

The following operating standards will be used in testing the MMD-1 system:

- \$ The unpacking and preparation of chemical warfare materiel for detoxification in the munition treatment vessel (MTV) will occur according to standard procedures under strict engineering controls. A designated unpack area will be located inside Building 3445, East Chamber.
- \$ All detoxification operations will be conducted inside the MMD-1 process trailer located within Building 3445, East Chamber, an enclosed structure.
- \$ Access to the MMD-1 test area will be strictly controlled. Only authorized personnel will be allowed in Building 3445.
- \$ All unpack and detoxification operations will be conducted with the knowledge of a supervisor and according to specific procedures.
- \$ Detoxification activities will be performed remotely by operators trained to safely operate the MMD-1 system and to respond to emergency incidents. All operations will be visually monitored using cameras and controlled by a Digital Control and Instrumentation System (DCIS) and cameras so that any equipment malfunctions will be readily detected and mitigated.
- \$ Processing during MMD-1 test activities will occur by chemical agent or industrial chemical campaign. Therefore, only one type of chemical agent or industrial chemical will be detoxified at a time. Additionally, the MMD-1 MTV will be rinsed with water between operations to prevent cross-contamination or mixing of different chemical agents or industrial chemical.
- \$ Because the chemical agents or industrial chemicals will be well-characterized before detoxification, only the appropriate reagent will be used in the MTV or liquid reactor vessel (LRV) during a detoxification process. All reagents will be pre-measured and will be added to a chemical agent or industrial chemical in a controlled manner.
- \$ A pre-operational inspection of the MMD-1 system equipment and Building 3445 system equipment will be conducted daily prior to use to ensure proper working conditions.
- \$ All detoxification steps and results will be recorded as part of the MMD-1 operating record and will include such information as start and stop time, materiel being treated, and operating conditions.
- \$ Vapors and gases formed during the detoxification process will be passed through the gas processing and waste gas processing system prior to being vented to the MMD-1 process trailer carbon filtration unit. The filtered exhaust air from the process trailer will then be released to Building 3445, East Chamber and vented to the Building 3445 carbon filtration system.

\$ Building 3445 will be maintained at a slightly negative pressure relative to the atmosphere to ensure that any releases will remain in the test chamber.

These operating standards will aid in preventing releases of hazardous waste constituents that may have adverse effects on human health or the environment.

B1.6 SITE HYDROGEOLOGIC CONDITIONS [40 CFR 264.601(a)(2), 264.601(a)(3), 264.601(a)(4), 264.601(b)(3), 264.601(b)(5); R315-8-16]

B1.6.1 Regional Hydrology

Annual precipitation is six to eight inches per year in the vicinity of Building 3445. Precipitation is lost primarily through evaporation or evapotranspiration, with only a very small fraction of the total precipitation available for runoff or to recharge local groundwater systems. Drainages flowing through DPG are ephemeral and intermittent, with surface water flow resulting from storm activity as well as from perennial streams in mountains adjacent to DPG. Runoff in the drainages either evaporates, infiltrates into the stream beds, or flows into the desert floor, where it generally evaporates quickly. Drainage in the Carr Facility is to the northwest, toward Ditto Technical Center. A description of surface water is provided in Section B1.9.

Depth of groundwater and groundwater flow varies throughout DPG. A groundwater divide occurs along a bedrock high near English Village, with groundwater east of this flowing into Skull Valley and groundwater west flowing into the Dugway Valley. Depth of potable water varies between 80 feet in the English Village area to over 300 feet in the Government Creek Valley, although shallower, brackish/saline water-bearing intervals occur above potable water aquifer(s). Potable water generally occurs within aquifers of the "old" alluvium, although shallow potable water zones have been noted, such as the aquifer encountered at a depth of approximately 200 feet below ground surface (BGS) in the Carr-Government Creek area.

Groundwater quality at DPG ranges from saline to potable, and salinity increases to the west toward the Great Salt Lake Basin. The Carr Facility area is in the Dugway Valley/Government Creek hydrogeologic system. The groundwater flow is to the west-northwest, toward the Great Salt Lake Desert. The hydrostratigraphy beneath the area consists of Pleistocene unconsolidated lacustrine deposits of Lake Bonneville and Quaternary alluvial deposits. Underlying these deposits are older, unconsolidated to consolidated alluvia of Quaternary and Tertiary age. The major source of groundwater for wells in the Dugway Valley is the saturated older alluvium. Saturated hydrogeologic units in the lacustrine deposits are generally low yielding, due to the fine-grained composition of the deposits.

Groundwater monitor wells installed east of the Carr Facility on Old Lincoln Highway show that the first water-bearing zone occurs at depths ranging from 56 to 58 feet below ground surface (BGS). The lithology of the water-bearing zone in this locality consists of fine-grained silty sands.

Three water production wells have been drilled in the Carr Facility area since the 1940s. DPG Well Number 4 is listed as an inactive well. DPG Well Number 29 is listed as an active standby well. DPG Well Number 5 is active. These three wells were completed to depths ranging from 270 to 450 feet BGS. Based on the well logs, water is produced from unconsolidated sands and gravel. Depths to the top of the older, coarse-grained alluvium range from 235 to 290 feet BGS. Only Wells Number 4 and 5 are located in the general vicinity of Building 3445. Well Number 29 is approximately 2 miles southeast of the Carr Facility.

The Carr Facility area consists of superficial alluvial soils that have been reworked by recent alluvial action. Government Creek, an active stream channel, is located just to the west of the Carr Facility. Drainage is to the northwest toward Ditto. Underlying the recent alluvial soils are Pleistocene Lake Bonneville lacustrine sediments. Underlying the Lake Bonneville lacustrine sediments are older alluvial deposits consisting of sands and gravel. The Lake Bonneville sediments consist of lacustrine and alluvial deposits ranging from clay to coarse gravel. The thickness of the Lake Bonneville sediments is believed to be less than 100 feet.

The shallow subsurface and surface soils of the Carr Facility are classified as typical Calciothids. These soils are fine-grained silty soils that are moderately well-drained and have moderately slow permeability. **Table B1-4** presents generalized horizontal hydraulic conductivities and porosities for gravels, sands, silts, and clays.

B1.6.2 Groundwater Monitoring at the Carr Facility and Building 3445

Results of groundwater quality and monitoring in the vicinity of Building 3445 are described in the DPG Groundwater Monitoring Reports and in DPG installation Restoration Program Documents.

B1.7 SITE PRECIPITATION [264.601(b)(4); R315-8-16]

The climate at DPG in general and the Carr Facility area in particular is arid. The annual precipitation varies from less than 6 inches on the desert floor to 20 inches in the Cedar Mountains, approximately 8 miles north of the Carr Facility area. The annual precipitation at the Carr Facility area is six to eight inches. Precipitation is primarily consumed by evaporation or evapotranspiration, with only a very small fraction available for runoff or recharge to the local groundwater system. Due to the arid conditions at DPG, precipitation events will not impact the MMD-1 test. In addition, the MMD-1 system will be located in a process trailer that will be placed inside Building 3445, an enclosed structure. No precipitation or runoff will enter the MMD-1 test area, and no runoff will be generated to adversely affect surface water or groundwater in the area.

**Table B1-4. Typical Hydraulic Conductivity and Porosity Values for Geologic Media
(Freeze and Cherry, 1979)**

Media	Porosity Range (%)	Hydraulic Conductivity Range (m/sec)
Gravel	25-40	10^{-3} to 1
Sand	25-50	10^{-6} to 10^{-2}
Silt	35-50	10^{-9} to 10^{-5}
Clay	40-70	10^{-12} to 10^{-9}
Sandstone	5-30	10^{-10} to 10^{-6}
Shale	0-10	10^{-13} to 10^{-9}
Fractured crystalline rock	0-10	10^{-8} to 10^{-4}

Source: Dugway Proving Ground Resource Conservation and Recovery Act (RCRA) Part B Permit Application for Open Burning/Open Detonation Areas.

B1.8 GROUNDWATER USAGE [40 CFR 264.601(a)(5); R315-8-16]

The groundwater extraction wells closest to Building 3445 are DPG Wells Number 4 and 5. Well Number 4 is an inactive potable water well with a depth of 170 feet, located in the vicinity of AB® Street and 6th Avenue, approximately 800 feet from the west side of Building 3445. Well Number 5 is an active potable water well with a depth of 320 feet, located in the open storage area southwest of the Carr Facility fence line approximately 1,200 feet from the west side of Building 3445. The withdrawal rate of Well Number 5 is 310 gallons per minute.

Groundwater contamination resulting from operating the MMD-1 system is precluded by the distance of Building 3445 from the wells, and by the MMD-1 system being located inside a process trailer within an enclosed building (Building 3445, East Chamber). No precipitation or run-on will enter the MMD-1 system operation area and no runoff will be generated.

B1.9 SURFACE WATER [264.601(b)(6), 264.601(b)(7); R315-8-16]

The general direction of surface water drainage at DPG is to the northwest, onto the Great Salt Lake Desert. There are no permanent streams within the DPG boundaries. Streams flowing through DPG are ephemeral and intermittent, with surface water flow resulting from storm activity within the installation, as well as from intermittent streams that exist in the mountains adjacent to DPG. Runoff from the mountain streams and precipitation within the installation flow through well-established drainage channels. The surface water then either infiltrates into the alluvium of the stream channels or runs onto the flat plain of the desert, where it evaporates quickly.

Government Creek is the major drainage feature in the vicinity of the Carr Facility area, approximately 1.5 miles to the west. Government Creek is an intermittent stream that originates in the mountains, approximately 19 miles southeast of the Carr Facility area, and flows northwest. The total Government Creek drainage area is 181 square miles, 69 square miles of which are inside of DPG boundaries. The slope of Government Creek varies from 0.17 percent near the Building 3445, East Chamber area to 25 percent in the mountains. Flash floods have occurred in the Government Creek drainage on four recorded occasions (1944, 1952, 1973, and 1983) following high precipitation events. The area affected was the roadways in the Ditto Technical Center, located approximately 2.5 miles northwest of the Carr Facility. The flow of Government Creek is restricted by a road culvert in the Ditto area. The restriction causes the minor flooding of the area to the south. Although the 100-year flood boundary has not been established at DPG, the maximum width of the 100-year floodplain established for any drainage way in nearby counties is 1,000 feet. It is not likely, therefore, that the Building 3445 area is located in the 100-year floodplain of Government Creek.

The surface water that flows in Government Creek and the drainage adjacent to the Carr Facility area are not used for water supply or recreation. The surface water is also not used for irrigation, and the area is not used for grazing domestic animals. Wildlife in the area may use the streams when water is present.

Contamination of surface water in the vicinity of the MMD-1 system test will be precluded by the MMD-1 system being located inside the process trailer, which will be located inside Building 3445, East Chamber (an enclosed structure), and the distance of Building 3445 to surface water (approximately 1.5 miles).

B1.10 AREA LAND USE [264.601(a)(6) and (b)(9); R315-8-16]

DPG contains three major activity areas: 1) the housing, administrative, and National Guard maneuver areas (including English Village and Fries Park), 2) the Avery and Ditto Technical Centers and Carr Facility, and 3) Baker Laboratory, the test grid, and buffer areas (including the joint-use area) south and west of Ditto Technical Center. DPG consists of approximately 2.75 square miles of improved and semi-improved land, with the remaining land unimproved. Most of the improved and semi-improved areas are in English Village.

Small tracts of state and privately-owned land are scattered throughout that area, which is under the jurisdiction of the Bureau of Land Management (BLM). Land used by DPG outside its border includes: 1) 1.95 hectares to the south containing three meteorology stations (used under a temporary license with BLM) and, 2) five tracts of land in the southern triangle totaling 2.182 hectares (leased from private individuals) (DPG, 1982). The land surrounding DPG is predominantly used for grazing. All the land within a radius of approximately 5 miles of Building 3445 is located within DPG boundaries.

DPG is located in a sparsely populated portion of the state, with only two urban areas located within a 30-mile radius of the facility: Tooele, with a population of approximately 14,000, and Grantsville, with a population of approximately 4,000. Approximately 1,650 people live on DPG at English Village, approximately 13 miles from Building 3445 (Carr Facility area). The land immediately surrounding Building 3445 is used for proving and testing Army chemical agents and munitions; the closest non-military use of land occurs several miles away, where the land is used for agriculture (ranching). The land within 1,000 feet of DPG boundaries is salt flats of the Great Salt Lake Desert (to the north and west).

Sheep grazing is confined to the non-irrigated, higher elevation portions of the valleys. Large herds of livestock are moved semiannually from south of DPG through Skull Valley and Rush Valley north to the summer ranges in the mountains of Nevada, Wyoming, and Utah, and to their winter ranges in the deserts of western Utah. The nearest grazing farming land is approximately 4.5 miles to the west.

Agricultural activity in the vicinity is confined almost exclusively to the Rush, Tooele, and Skull Valleys. Tooele County ranks second of the state's 29 counties in total area, but only seventh in the percentage of area committed to agriculture, with less than one percent of the county land committed to either cropland or pasture. Approximately one-tenth of county land is committed to range and one-fiftieth of its land is committed to forest. Irrigation is necessary for agriculture in Skull Valley, Rush Valley, and most of Tooele Valley. The growing season lasts from 90 to 160 days, depending on geographic location and elevation. **Table B1-5** presents the major cash crops for Tooele County.

Land adjacent to DPG in Tooele County is zoned by the county for multiple use. To discourage private exploitation, sale of land is restricted to parcels of at least 16 hectares. Land adjacent to DPG in Juab County is zoned by the county as "outlying land." Although a 16-hectare lower limit is not used in Juab County, approval must be obtained from the Board of County Commissioners before rezoning or development can occur in the outlying land. DPG's master planner uses

Table B1-5. Agricultural Data for Tooele County

Year	Wheat Bushels ^a	Barley ^a	Oats ^b	Hay ^a	Alfalfa ^b	Sheep or Lamb	Beef Cattle Calves
1974	85,294	39,233	10,568	27,192	22,035	49,789	13,701
1978	109,944	46,089	4,150	30,234	22,950	22,950	13,826
1981	21,400	50,463	ND	ND	21,300	ND	18,300

NOTES:

a Hectoliters (100 liters)

b Metric tons

ND = No data

TM 5-803-2, AR 210-20, and Department of Defense Construction Criteria Manual 4270.1-M in developing and regulating its land use.

B1.11 MIGRATION OF WASTE CONSTITUENTS [40 CFR 260.601(a)(7); R315-8-16]

The migration of waste constituents from the MMD-1 system will be mitigated by the following factors:

- \$ The MMD-1 system will be located within an enclosed building (Building 3445)₂ which will be protected from precipitation and run-on. No runoff will be generated.
- \$ All detoxification processes will be conducted by trained operators who will be able to initiate immediate action in the event of a problem.
- \$ The floor of the process trailer will provide secondary containment of liquids if the MTV or LRV were to breach. Surge tanks will be provided with individual secondary containment pans for liquid spills, and Building 3445, East Chamber will provide containment of all liquids and vapors should a breach occur.
- \$ Vapors and gases formed during the detoxification process will be passed through the gas processing and waste gas processing systems prior to being vented to the MMD-1 process trailer carbon filtration unit. The filtered exhaust air from the process trailer will then be released to the Building 3445, East Chamber and vented to the Building 3445 activated carbon filter system.
- \$ MMD-1 system equipment and Building 3445 equipment will undergo a daily pre-operational check prior to first use to ensure they are in proper working condition.

- \$ Building 3445 will be maintained at a negative pressure to ensure that any spills or leaks remain in the test area. Air exhausted from Building 3445 will pass through an activated carbon filter systems before release to the atmosphere.
- \$ Any spills or leaks that occur outside of MMD-1 system engineering controls will be cleaned up and managed in accordance with the contingency plan described in Section 10 of this permit application. A spill or leak that occurs within engineering controls will not be considered a release and will be managed as part of normal cleaning operations.

B1.12 EVALUATION OF RISK TO HUMAN HEALTH AND ENVIRONMENT
[40 CFR 264.601(a)(8)(a), 264.601(b)(10)-(11), and 264.601(c)(6)-(7);
R315-8-16]

The risks posed to human health by operating the MMD-1 system will be minimal. Only authorized personnel will be permitted in the test area during operations. Any liquid or vapor released during detoxification operations will be contained within engineering controls of the process trailer and Building 3445 and therefore will not pose a threat to other DPG personnel working in the vicinity of Building 3445.

As indicated in Section B1.10, there are no domestic crops or animals in the vicinity of the MMD-1 system operations. Therefore, conducting the MMD-1 test activities will not pose a threat to these receptors. The treatment process will be conducted inside the MTV or LRV, located within the process trailer and Building 3445. The detoxification operations are well-protected by these structures. The only credible pathway for the migration of waste constituents will be the air discharged from the MMD-1. Air emissions will be managed as described in Section B1.4.

Trained operators will always be present during actual detoxification operations, to provide immediate response to any problem that may occur. Any liquid releases from the MMD-1 system into the process trailer or into Building 3445 will be cleaned up and managed as described in Section 5. Releases occurring outside engineering controls will be cleaned up and managed in accordance with the contingency plan described in Section 10 of this permit application.